

## 3.3 Slopes of Lines

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{\Delta y}{\Delta x}$$

Find the slope.

1. A(1, 3) B(-2, -3)

$$m = \frac{3 - (-3)}{1 - (-2)} = \frac{6}{3}$$

$$m = 2$$

$$m = \frac{3 - (-3)}{-2 - 1} = \frac{-6}{-3} = 2$$

2. C(8, -2) D(5, 3)

$$m = \frac{3 - (-2)}{5 - 8} = \frac{5}{-3}$$

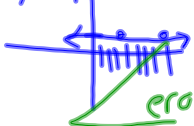
3. E(8, 1) F(4, 1)

$$m = \frac{1 - 1}{8 - 4} = 0$$

Zero

Horizontal line

$$y = 1$$



4. G(-2, 1) H(-2, -5)

$$m = \frac{1 - (-5)}{-2 - (-2)} = \frac{6}{0}$$

undefined  
No slope

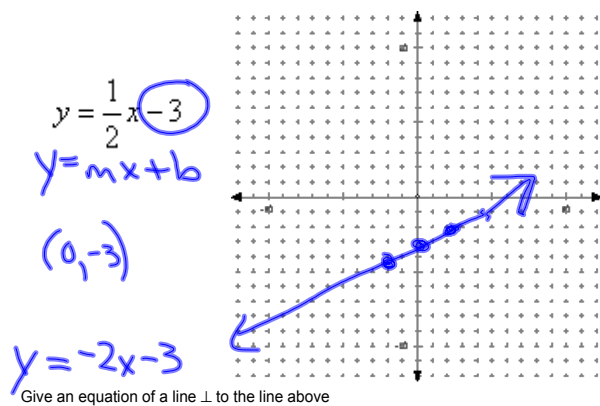
Vertical line

$$x = -2$$

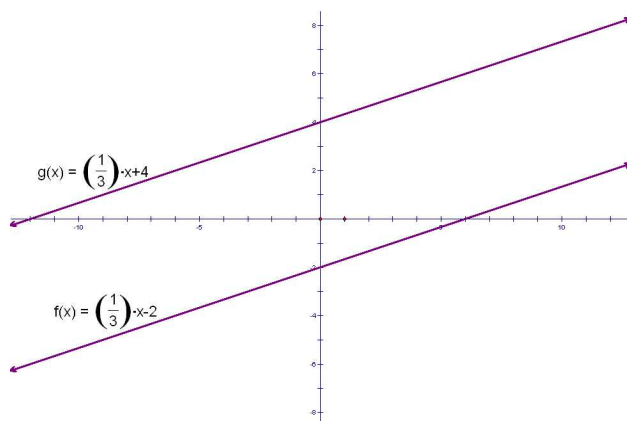
No slope

Parallel lines have the same slope  
(Postulate 3.2)Perpendicular lines have slope with opposite reciprocals

$$m = \frac{2}{3} \perp m = -\frac{3}{2}$$



Graph the two equations listed.



3-4 Equations of lines  
Slope-intercept form

$$y = mx + b$$

Point-slope form

$$y - y_1 = m(x - x_1)$$

Standard form

$$Ax + By = C$$

*b - y-int.*  
*m - slope*

A, B, & C are integers, A is positive,  
A, B, & C have a GCF of 1

Write the equation of the line given the following information.

1. (0, 8)  $m = 3$

$$\begin{aligned} y &= mx + b \\ y &= 3x + b \\ y &= 3x + 8 \end{aligned} \quad \begin{array}{l} \text{Std. Form} \\ 3x - y = -8 \end{array}$$

2. (-3, -6)  $m = 2$

$$\begin{aligned} y &= mx + b \\ y &= 2x + b \\ -6 &= 2(-3) + b \\ -6 &= -6 + b \\ 0 &= b \end{aligned}$$

$$\boxed{y = 2x}$$

$$2x - y = 0 \quad \text{Std. Form}$$

3. (6, -3) (8, -9)

$$m = \frac{-9 - (-3)}{8 - 6} = \frac{-6}{2} = -3$$

Point-slope

$$y - y_1 = m(x - x_1)$$

$$\boxed{y + 9 = -3(x - 8)}$$

4. Write the equation of the line  $\perp$  to  $2x + y = 5$  and passes through (1, -7).

$$\begin{aligned} 2x + y &= 5 \\ y &= -2x + 5 \\ m &= -2 \end{aligned}$$

$$\begin{aligned} m &= \frac{1}{2} \\ (1, -7) &\rightarrow \begin{aligned} y &= mx + b \\ y &= \frac{1}{2}x + b \end{aligned} \\ \boxed{y = \frac{1}{2}x - 7\frac{1}{2}} &\quad \begin{aligned} -7 &= \frac{1}{2}(1) + b \\ -7\frac{1}{2} &= b \end{aligned} \end{aligned}$$

$$\begin{aligned} 2\left(\frac{1}{2}x - y\right) &= 2\left(-7\frac{1}{2}\right) \\ x - 2y &= -15 \end{aligned} \quad \text{Std. Form}$$

5. Write the equation of the line  $\parallel$  to  $3y - x = 4$  and passes through (3, 10).

6. Write the equation of the line  $\perp$  to the line containing (4, 3) (4, 8) and passing through (2, -9).

$$m = \frac{8-3}{4-4} = \frac{5}{0}$$

undefined  
vertical

horizontal  
 $y = -9$

HW	p142-143 15-23 odd, 28, 31, 33, 36
	P148-149 19, 22, 39, 41, 43, 44